

DISCLOSURE OF THE INVENTION

It is an object of the present invention to provide a safe hyaluronic acid compound which has excellent bio-adaptability.

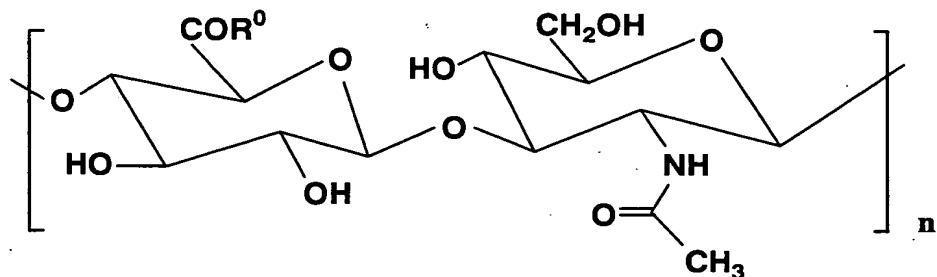
5 It is another object of the present invention to provide a hyaluronic acid compound which provides a hydrogel strong enough to be used in a region under a load *in vivo*.

It is still another object of the present invention to provide a molded form of the above hyaluronic acid compound which is insoluble in an aqueous medium.

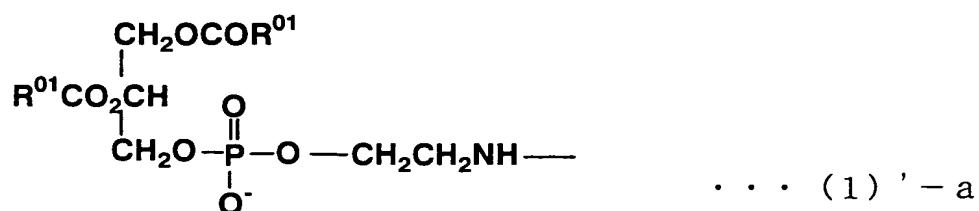
It is a further object of the present invention to provide a joint treating material which is the above hyaluronic acid compound of the present invention.

Other objects and advantages of the present invention
15 will become apparent from the following description.

According to the present invention, firstly, the above objects and advantages of the present invention are attained by a hyaluronic acid compound represented by the following formula (1)':



wherein R⁰ is a group represented by the following formula (1)'-a. -OH or -ONa.

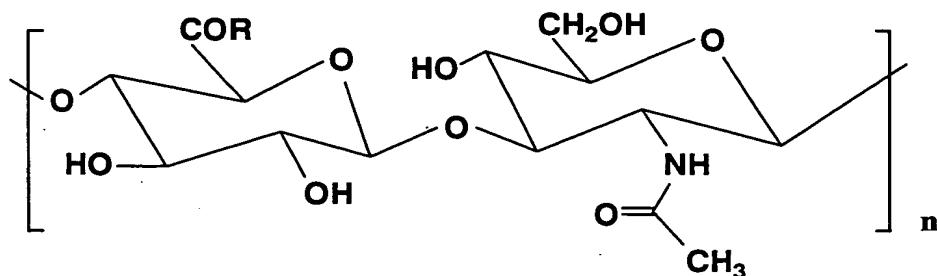


wherein R^{01} is an alkenyl group having 10 to 28 carbon atoms, and n is an integer of 50 to 50,000, with the proviso that 1 to 100 % of R is the group represented by the above formula (1)'-a.

5 According to the present invention, secondly, the above objects and advantages of the present invention are attained by a hydrogel of the above hyaluronic acid compound of the present invention.

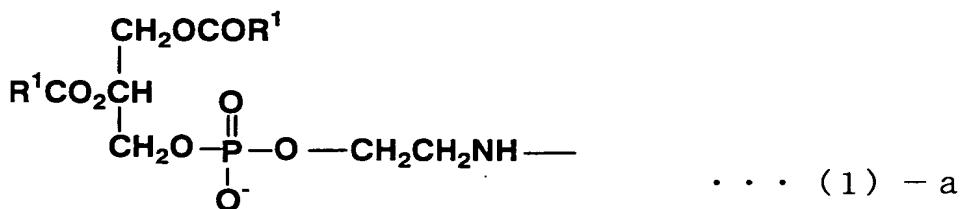
According to the present invention, thirdly, the above objects and advantages of the present invention are attained by a molded form of the above hyaluronic acid compound of the present invention.

According to the present invention, in the fourth place, the above objects and advantages of the present invention are attained by a joint treating material comprising a hyaluronic acid compound represented by the following formula (1):



• • • (1)

20 wherein R is a group represented by the following formula
(1)-a, -OH or -ONa,



wherein R¹ is an alkyl group or alkenyl group having 10 to 28 carbon atoms,

25 and n is an integer of 50 to 50,000, with the proviso that

1 to 100 % of R is the group represented by the above formula (1)-a.

BRIEF DESCRIPTION OF THE DRAWING

5 Fig. 1 shows the comparison of histological evaluation on the joint of rabbit's knee 8 weeks after an operation between Example 5 and Comparative Example 5.

BEST MODE FOR CARRYING OUT THE INVENTION

10 The hyaluronic acid compound of the present invention is represented by the above formula (I)' and the hyaluronic acid compound used as a joint treating material of the present invention is represented by the above formula (I). In the above formula (I), R is a phosphatidyl ethanolamino group
15 represented by the formula (I)-a, -OH or -ONa. And, in the above formula (I)', R⁰ is a phosphatidyl ethanolamino group represented by the formula (I)'-a, -OH or ONa, in proviso that 1 to 100 % of R or R⁰ must be a phosphatidyl ethanolamino group. When the phosphatidyl ethanolamino group accounts
20 for less than 1 % of R or R⁰, the object of the present invention is not attained. R is an alkyl group or alkenyl group having 10 to 28 carbon atoms, preferably 14 to 20 carbon atoms, and R⁰ is an alkenyl group having 10 to 28 carbon atoms, preferably 14 to 20 carbon atoms. n is an integer of 50 to 50,000,
25 preferably 300 to 30,000, more preferably 1,000 to 10,000.

Examples of the alkyl group having 10 to 28 carbon atoms represented by R include decyl, undecyl, lauryl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, stearyl and eicosanyl. Examples of R or R⁰ which is the alkenyl group
30 having 10 to 28 carbon atoms include alkenyl groups having 1 to 3 carbon-carbon unsaturated bonds, corresponding to the above alkyl groups, such as oleyl group.

The compound represented by the above formulae (I) or (I)' is preferably a compound of the formula (I)-a in which

two R^1CO- groups or a compound of the formula (I)' -a in which two $R^{01}CO-$ groups, are oleoyl groups.

The hyaluronic acid compound represented by the above formula (I) or the above formula (I)' can be prepared by 5 reacting hyaluronic acid with a phosphatidyl ethanolamine.

The hyaluronic acid may be extracted from an animal tissue or manufactured by fermentation. A strain used in fermentation is a microorganism having the ability of producing hyaluronic acid which belongs to the genus

10 *Streptococcus*, such as *Streptococcus equi* FM-100 (JP-A 63-123392) or *Streptococcus equi* FM-300 (JP-A 2-234689) all of which are known. What are prepared by culturing and refining variants thereof may also be used. The molecular weight of the hyaluronic acid is preferably about 1×10^5 15 to 1×10^7 . The term "hyaluronic acid" as used herein includes alkali metal salts such as sodium, potassium and lithium salts of hyaluronic acid.

Further, the phosphatidyl ethanolamine may be extracted from an animal tissue or synthesized. Examples 20 of the phosphatidyl ethanolamine include